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THE SPHAGNUM BOGS OF MAZAMA DOME

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This paper deals with some small sphagnum bogs occurring at relatively high elevations and characterized by a very simple plant association.

Mazama Dome is a flat-topped mountain having an elevation of 6,000 feet (U. S. G. S., 1915). It is situated in Whatcom County, Washington, on a spur extending westward from the main ridge of the Cascades to Mount Baker. Austin Pass crosses this spur between Mount Baker and Mount Shuksan at an elevation of 4,630 feet (U. S. G. S., 1915). Mazama Dome is between the pass and Mount Baker. The visits to the dome were made on August 6 and 7, 1921; August 5 and 8 were spent in observation of the sphagnum occurring in other places in the vicinity of the pass.

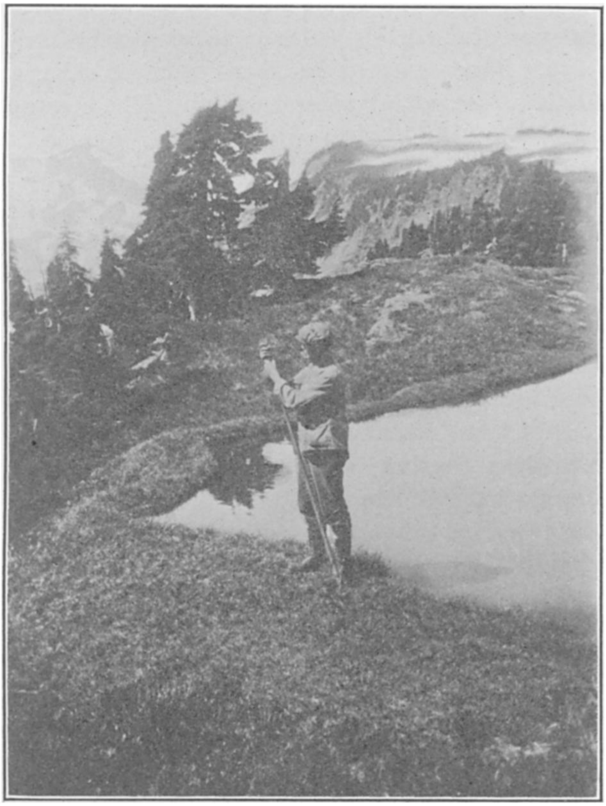

FIG. 1. Bog bordering the lake on Mazoma Dome

At the time of these visits there was considerable snow on the summit of this dome, and, although the cairn of rocks marking the highest point was bare, a snow field began only a few yards from it. The bogs are on a bench-like flat, situated just to the south of and below the ridge occupied by this snow field, and receiving water in small rivulets from the melting snow. At the south side is an abrupt descent of several hundred feet. During the daytime in summer this flat has an abundance of light and moisture and the temperature of the air is rather high.

One bog, typical of this flat, forms the south side of a pond, on the north of which is a mass of loose rock. The pond seems to have originated from the obstruction of drainage on a very gentle slope by the growth of vegetation and the accumulation of the debris, either intact or partially decayed, resulting from this growth. The vegetation has thus formed a ridge or dam several feet high and only a foot or two wide at the top. The bog association occupies the top and the south side of this ridge.

The surface of this ridge of vegetation is at present composed almost entirely of living sphagnum. In this the most abundant plant is the swamp laurel, *Kalmia polifolia,* which was rarely found in the vicinity outside of sphagnum-dominated areas, while such areas were rarely found without this plant. All the Kalmia seen was small (usually 6 to 9 inches tall), and seems to be identical with the variety *microphylla.* It was in full bloom at the time of the visits.

The low bush huckleberry, *Vaccinium deliciosum,* was fairly abundant in most of this bog and was common in the vicinity. In a few places, mostly in the margin of the sphagnum-dominated area, the red heather, *Phyllodoce empetriformis,* grew with the three plants mentioned. This heather was very abundant in the vicinity, but practically stopped at the margin of the sphagnum. Partridge-foot, *Lutkea pectinata,* was also abundant in the vicinity, but very few specimens of it grew in the sphagnum.

A sedge, *Carex* sp., was abundant in the sphagnum next to the water of the pond, and formed much of the water margin of the ridge. Mosses, mostly *Hypnum* sp., other than sphagnum grew with the sedge at the margin of the water, often extending over the edge into the water. Sphagnum was not growing into the water of this pond at all.

Several samples of the substratum of this ridge were taken at a depth of 6 inches. Those under pure living sphagnum consisted of the same plant slightly decayed. Those under the tension line between sphagnum and the sedge were much more fibrous, but contained a little sphagnum.

This bog association is thus seen to be composed essentially of only two plants, sphagnum and swamp laurel, with a third (low-bush huckleberry) sometimes present; while other plants such as red heather and partridge-foot thrive in the vicinity, but are unable to enter the bog association to any considerable extent. This is a very simple bog association as compared with that found in other bogs of the Puget Sound region. Several of these, mainly at low levels, have been described by the writer (1913, 1919). In most of this region the bog association consists rather constantly of *Sphagnum* spp., Labrador tea, *Ledum groenlandicum;* swamp laurel, *Kalmia polifolia;* cranberry, *Oxycoccus oxycoccus,* and sundew, *Drosera rotundifolia,* with the occasional addition of other plants such as sweet gale, *Myrica gale;* a gentian, *Gentiana sceptrum,* and crowberry, *Empetrum nigrum.*

Vegetation seems to be advancing on the water of this pond. The sedge and mosses other than sphagnum are clearly the pioneers, the mosses being usually a little in advance of the sedge. Sphagnum itself is not functioning as a pioneer in the advance of the bog, nor is the bog association as such advancing directly on the pond. It advances only by the aid of the sedge-moss association. The samples of the substratum seem to indicate that the bog association has been dominant here for some time, and that, with the sedge-moss association functioning as the pioneer, it has been responsible for the building up of at least the upper portion of this ridge.

In other places in the vicinity there are similar ponds apparently formed in a similar way. They are on places where the substratum slopes gently to the south, and the south side of each is composed of a ridge of vegetation topped at present by the bog association, with the sedge-moss association next to the water and functioning as the pioneer. In only one case was sphagnum found growing directly into the water; here it extended out about a foot and occupied about 3 feet of the shore line. In a few places this simplified bog association, consisting mainly of sphagnum and *Kalmia,* was found on the flat in wet spots not bordering on ponds; in fact, most of these spots were not on water at all, although one was along a rivulet flowing down a slope of perhaps 15° or 20°. In this case there was the usual margin of sedge and mosses along the water.

The fact that the flora of these bogs consisted mainly of only a single species besides sphagnum does not seem to constitute a valid objection to calling them bogs or to calling their characteristic flora a bog association. It is simple as compared with that of many other bogs, but is none the less a bog association.

Sphagnum was common in the vicinity of Austin Pass at elevations mostly approximating 4,000 feet or more. Patches of this moss, mostly only a few feet in diameter, were found in small undrained places along the trail for a distance of 2 miles or so north of the pass, and for a like distance to the south. There was a good deal of snow in the vicinity of the pass at the time of the visits and it is possible that some sphagnum was covered which might be exposed in more favorable seasons.

No case was seen in which the sphagnum had exercised any selective influence on the plants growing in it. The flora of the patches of this moss was the same as that of the other undrained places in the vicinity, many of which had other mosses growing in them instead of sphagnum. A horsetail, *Equisetum* sp.; a sedge, *Carex* sp., and green hellebore, *Veratrum viride,* were common in such places. Such patches of sphagnum are rather numerous in both the Cascades (Rigg, 1919) and the Olympics.

It is possible that these patches of sphagnum may represent early stages in bog succession in which the products of decay are not yet sufficient in quantity to exercise a selective influence on the flora. However, the drainage from such places is merely slow; not obstructed to any considerable extent. If a bog developed, its surface would have to rise considerably above the surrounding area. No swamp laurel has been seen by the writer in the immediate vicinity of these sphagnum patches in either the Cascades or the Olympics.

On the basis of this lack of distinctive flora these sphagnum areas seem to be clearly distinguished from the sphagnum areas on Mazama Dome, which do have a distinctive flora which is practically always found in them and only rarely outside of them. It seems justifiable to use the term "bogs" for the latter, while not using it for the former. The writer has elsewhere (1916) proposed as a definition of sphagnum bog "that stage in the physiographic succession of an area during which its surface is entirely devoid of ordinary 'hard' soil, and is composed completely of living sphagnum moss under which is fibrous brown peat composed mainly or entirely of partially decayed sphagnum." It is now proposed to add to this definition the limitation that the bog exercises a distinctly selective influence on its flora.

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